

REMARKS

Applicants gratefully acknowledge that many of the prior rejections or concerns have been withdrawn.

The specification text on page 10 is corrected.

Claim 1 as amended corresponds to the allowed Claim 1 of the equivalent European patent application. Latest claims in the EP application are enclosed.

Applicants have further amended the claims to reflect the pressure can and composition, for the pending claims in the present invention. These claims have been specifically amended to better explain and describe the present invention.

As to the test report/test results submitted earlier, the examination before the European Patent Office was based on the prior art cited in the international search report. According to the European examiner, the most pertinent prior art was EP 0 480 342 A, its disclosure being close to that of the Pauls ('412) reference.

We argue again that the test report (see Declaration) can also be applied to the teaching of the Pauls ('412) reference.

The merits of the present invention are related to the finding that the combination of aromatic polyesterpolyols derived from ethylene glycol or glycerol and having a hydroxy number of 100 to 300 have, in combination with certain phosphates and phosphonates, an improved flame resistance, when compared to polyetherpolyols of the same hydroxyl number.

This improvement is surprising and should be patentable in the U.S. as it is in Europe.

No new matter has been added to the application.

We now turn to the specific rejections.

REJECTION OF CLAIMS 2, 3, 11 and 16 UNDER 35 U.S.C. 112 (2nd)

Claims 2, 3, 11 and 16 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The Examiner states that:

“A Markush group has been inserted within claim 1 to specify that the propellant is selected from the group consisting of propane, butane, dimethyl ether, and combinations thereof. Therefore, since Markush language, by definition, is closed to the inclusion of other species, the subject matter of the rejected claims, indicating that the propellant is a fluorocarbon, fails to further limit claim 1. Furthermore, within claim 16, the word, “propellant”, remains misspelled.”

Applicants respectfully traverse this rejection.

The claims are amended to overcome this rejection.

Reconsideration and withdrawal is respectfully requested.

JOINT INVENTORS

The Examiner states that:

“This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(f) or (g) prior art under 35 U.S.C. 103(a).”

Applicants will examine inventorship when claims are allowed and make any appropriate correction.

REJECTION AGAIN OF CLAIMS 1-3, 6 AND 9-16 UNDER 35 U.S.C. 103 (a)

Claims 1-3, 6 and 9-16 are again rejected under 35 U.S.C. 103(a) as being unpatentable over Pauls ('412) in view of Falkenstein et al. ('313) and Friedman ('827).

The Examiner again asserts that:

“Pauls discloses a storage stable polyurethane prepolymer composition, having an NCO content of 5 to 25 percent by weight, derived from aromatic polyisocyanates and polyols, including polyester polyols, which may be dispensed from a pressure can to yield a dimensionally stable foam. See abstract and columns 2-4.

Pauls is silent regarding the use of phosphorous containing compounds as softeners and is further silent regarding the use of phosphorous modified esters (claim 6); however, the use of each of these components within polyurethane foam formulations was known at the time of invention. Falkenstein et al teach at column 3, lines 59-66 that the use of phosphorous containing compounds soften the foam and increase flame resistance. Despite applicant's arguments, the position is taken that urethane containing polyisocyanurates are similar to polyurethanes in terms of chemical composition and properties to the extent that one would have expected that additives useful in one composition would have been useful in the other. Friedman teaches the use of phosphorous containing polyols to provide flame resistance within polyurethanes. Despite applicants' response at page 8, the teachings of Friedman are considered to be relevant to the subject matter of instant claim 6, which is concerned with using phosphorous modified ester reactants in the production of the prepolymer.”

Despite Applicant's argument, the position is ultimately taken that it would have been obvious to utilize known components for their known functions within polyurethane compositions. It has been held that is *prima facie* obvious to utilize a compound for its known function (In re Linder, 173 USPQ 356; In re Dial et al., 140 USPQ 244); therefore, one of ordinary skill in the art would have been motivated to utilize the known polyurethane foam components with the teachings of the Pauls reference, so as to obtain a pressure can dispensable prepolymer capable of yielding a foam having improved flame resistance, dimensional stability, and softness.

The Examiner's most recent comment follows as: - -,

- - The examiner has considered applicants' arguments of January 21, 2003 and has again considered the declaration of July 26, 2002; however, the showings of the declaration are insufficient to remove the prior art rejection. Applicants' arguments and the showings of the declaration are not commensurate in scope with the subject matter of the instant claims. Despite applicants' arguments, the instant claims are not limited to the use of aromatic polyesters. The claims in no way require that an aromatic polycarboxylic acid be used to produce the polyester polyol. Additionally, it is not clear that unexpected results have been demonstrated in view of the teachings of the secondary references concerning flame retardancy. Lastly, applicants' remark at page 9, lines 2 and 3 is not understood, because the remark appears to be contrary to the subject matter of instant claim 6. The remark states that the polyester polyol is devoid of phosphate groups;

however, claim 6 requires that the polyester polyol be phosphorous modified.

The disclosure is objected to because of the following informalities: The compound names within the tables of the examples appear to be incomplete. Furthermore, within line 22 of page 10, it appears that Desmophen PU 578 should be Desmophen PU 1578."

Appropriate correction is required.

The objection for '578' (now corrected) was not addressed in the response to the previous Office action.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a)."

Applicants respectfully traverse this repeated rejection.

The Examiner rejected the Claims under U.S.C. 103(a) as being unpatentable over Pauls ('412) in view of Falkenstein et al ('313) and Friedman ('827) citing each reference for its individual teaching and then combining them alleging that a "prima facie" case of obviousness has been made.

As was argued earlier, Pauls specifically discloses prepolymer compositions based on polyesterols and aromatic polyisocyanates, additionally comprising tris-2-chloroethylphosphate as flame retardant. The propellants used are propane/butane mixture, $\text{CF}_2\text{Cl}_2/\text{CFCl}_3$ mixtures and CHF_2Cl /butane mixture which are fluorocarbon mixtures.

Thus, Pauls is different from the present invention in that he is silent on the combination of aromatic polyisocyanates with specific polyesterols based on aromatic carboxylic acids and ethylene glycol or glycerol, halogen free phosphates or phosphates, and the mixture of propane, butane and dimethylether as blowing agent/propellant.

As is shown in the test reports, polyesterols based on aromatic carboxylic acids and ethylene glycol have superior flame resistance when compared to prepolymers containing polyetherpolyols. Test report 1 gives a non-specific test comparing polyesterpolyols and

polyetherpolyols of different hydroxyl numbers (213 vs. 160). Test report 2 shows in tests 1 to 4 that aromatic polyesterpolyols have lower flammability, when compared to polyetherpolyols of roughly the same hydroxyl number, see samples 7 and 10. The B2 values reach from 110/120 for aromatic polyesterpolyols to 150 for polyetherpolyols. The test reports also show that this is a general behavior, which distinguishes polyesterpolyol based prepolymers from those based on polyetherpolyols.

This finding certainly is surprising. Despite of the fact that phosphorous containing compounds are known as flame retardants, it is everything but obvious that the combination phosphate/aromatic polyester polyol has improved flame retardency over the combination phosphate/polyetherpolyol.

This effect is nowhere disclosed in the related art and could not be expected by the skilled one. It is this effect that caused the European Patent Office to allow the application.

Applicants argue that Pauls ('412) never teaches or suggests the use of phosphorous containing compounds in these halogen-free polyalcohol based aromatic polyurethane polymers and it fails as a primary reference.

As now argued, Falkenstein discloses a one-shot foam formation from specific prepolymers and therefore is in a different technical field. These compositions cannot be used from a pressurized can because of the presence of a catalyst that would initiate the trimerization reaction of the isocyanate groups to the polyisocyanate inside the pressurized can. On the other hand, the present prepolymers contain a different catalyst that promotes a reaction of the prepolymers with moisture found in the air - after discharge. The present polyurethane foams from pressurized cans are intended for the mounting of door and window frames, whereas the one-shot polyisocynaurate foams of Falkenstein are mostly used for shaped articles. The two compositions are not comparable in their foaming properties and/or mechanical properties.

Applicants argue that the Examiner's interpretation of Falkenstein is in error. Falkenstein clearly states in col. 1, lines 12 to 31 that polyurethane foams made by reacting an organic polyisocyanate with a polyol such as a polyesterol and comprising phosphorous compounds, even if halogenated, do not show the degree of flame resistance and the mechanical

properties desired for such products. In fact, Falkenstein teaches away from the present invention when disclosing polyisocyanurate foams that have improved flame resistance over polyurethane foams and comprising the very same phosphorous compounds. The teaching of Falkenstein is summarized as: "Do not use phosphorous compounds when you wish to render your polyurethane foams flame resistant."

Applicants' finding that a sufficient flame resistance can be achieved by using a combination of aromatic polyisocyanates, aromatic phosphates or phosphonates and aromatic polyester polyols is therefore surprising, novel and patentable.

When making use of aromatic phosphates, the present invention not only achieves an acceptable flame resistance due to the aromatic groups in the phosphates. These aromatic phosphorous compounds have a reduced evaporation rate so that the long term flame resistance is also improved.

The flame resistance of the polyurethane foams obtained in accordance with the present invention is not alone due to the fact that phosphorous compounds are used. The phosphorous compounds only contribute to the flame resistance. As essential as aromatic phosphorous compounds are, the aromatic polyesterols having short chain polyols, such as glycol and glycerol, and of course aromatic polyisocyanates. All three components are necessary, and only their combination which is not taught in the art results in the improved flame resistance, without sacrificing mechanical properties that are necessary for the use of the foams for mounting purposes.

The test reports submitted earlier clearly show that the aromatic polyesterols make a considerable contribution to the flame resistance of the foams.

Thus, the present combination of aromatic polyesterols, aromatic polyisocyanates and aromatic phosphates and phosphonates is not anticipated or suggested in the prior art with its resultant effect on lowering flame resistance. While in the prior art polyurethane foams are replaced by polyisocyanurate foams in order to increase flame resistance, nobody ever thought of increasing the share of aromatic components in the polyurethane components to achieve the same flame resistance goal. In addition to being less costly, the present combination has the advantage of being suited for aerosol can applications.

Accordingly, a high degree of flame resistance is reached without the use of halogen containing material in the prepolymer component. Besides being a health hazard, halogen-containing compounds, such as tris-chloroethylphosphate disclosed in Falkenstein, have a high vapor pressure and tend to evaporate from the foams. These Falkenstein foams not only lose

their flame resistance but also their elasticity, this making them brittle and being counter productive to their mounting properties, on the long run. The present combination of the Applicant takes account of these effects.

In conclusion, the present invention is not obvious from the cited art.

As argued earlier, Falkenstein discloses polyisocyanurate foams. Starting point is the finding that polyurethane foams containing phosphorous-halogen compounds, such as exemplified by Pauls, have proved to be insufficient in flame resistance, see col. 1, l. 12 to 31. Therefore, the polyurethane backbone of traditional foams was replaced by a polyisocyanurate backbone, which has a higher nitrogen and oxygen content and provides for additional flame resistance. However, polyisocyanurates are prepared by a different catalytic process than polyurethanes and have not been found practical for aerosol applications. Flame resistance is primarily provided by the use of highly halogenated polyols, which teaches away from the present invention. Comparative examples 2 and 3 show that without the halogen containing polyols the foams are readily flammable, even in the presence of additional flame retardants, such as chloroparaffins and antimony trioxide. There is no teaching or suggestion of the present combination including the aromatic polyesterpolyols.

Moreover, the catalytic formation of polyisocyanates principally excludes such prepolymers from being used from one component cans.

The Examiner is in error concerning Falkenstein ('313). The Falkenstein reference, though concerned with prepolymers, differs significantly from the present invention. The foams produced there are polyisocyanurate foams. Such foams are normally not produced from pressurized cans, but in a commercial plant from tanks by mixing the components in the spray head. Polyisocyanurate foams are based on a trimerization reaction of isocyanate groups using special catalysts, whereas the one-component polyurethane foams of the present invention are based on the reaction of isocyanate groups with water. The prepolymer compositions therefore need different catalysts, and the polymeric foams obtained therefrom have different characteristics and fields of application.

Why would one of skill in the art combine these teachings to produce the present

invention? Applicants argue they would not. One reference describes polyurethane and the other describes polyisocyanurate foams. There is no teaching or suggestion in either reference of the existence of the other. The "obvious-to-try" standard is not a proper standard for 35 U.S.C. 103.

Friedman ('827) teaches that his phosphorus containing compounds must have reactive hydroxyl groups which react to incorporate the Phosphorus containing group into the polyurethane matrix. This is unlike Applicant's invention of non-reactive phosphorous containing fire retardant compounds.

Friedman ('827), on the other hand, not only has no relation to foam formation from aerosol cans, but in fact teaches away from the present invention when stating in the passage bridging col. 4/5 that the hydroxyl number of the hydroxy reactions should be very low, preferably at least 35 for a good flexible foam.

The structure of the phosphorous compounds disclosed by Friedman is closely related to polyetherpolyols, in that the polyol component of the phosphorous compound is made from polyalkylene glycols. Insofar, Friedman also teaches away from the present invention, where the polyol is a polyesterpolyol. The present polyesterpolyols are aromatic and do not contain phosphate groups within the molecule. Phosphates having aromatic polyesterpolyol groups and having a structure similar to the Friedman compounds are principally existent; however, such compounds inevitably would have such high molecular weight that the hydroxyl number would be well below 100, outside the range of the present invention.

Falkenstein '313 and Friedman '827, though being related to foaming technology, have no relation, what so ever, to foam preparation from aerosol cans.

Applicant respectfully urges that the Examiner's position that has made a valid prima facie case of obviousness is in error.

Although the cases cited by Examiner hold that it is prima facie obvious to use a compound for its known function as the examiner has stated in each of In re Hiner, 173USPO356 and in re Dial et al. 140 USPQ244 those references specifically suggested combining the claimed elements.

In Applicant's case there is no such suggestion in any of the cited references that all of the elements of applicants novel combination could be combined.

The following references were cited earlier:

Custom Accessories Inc. v Jeffrey-Allan Industries, Inc. 1 U.S.P.Q.2d 1196 (Fed. Cir. 1986).

In re Geiger, 2 U.S.P.Q. 2d 1276 (Fed. Cir. 1987).

In re Dow Chemical to 5 U.S.P.Q.2d 1529 (Fed. Cir. 1988).

SUMMARY

Based on the above amendments and arguments, Applicants argue that the present claims are of a form and a scope for allowance. Prompt notification thereof is respectfully requested.

Applicant-respectfully requests that these rejections be withdrawn and that in view with the terminal disclaimer filed in the now abandoned parent application that this case is in condition for allowance.

A Combined Notice of Appeal and Petition for Extension of Time is enclosed.

Applicants request this amendment be entered into the record for the purpose of appeal.

Alternatively, Applicants request a new non-final rejection.

APPLICANTS WILL CONSIDER ANY EXAMINER'S AMENDMENTS OR REQUESTS FOR DOCUMENTS WHICH WILL ADVANCE THIS APPLICATION TO ISSUE.

THE EXAMINER IS REQUESTED TO CALL THE UNDERSIGNED AT (650) 324-1677 x 3 WITH ANY COMMENTS OR QUESTIONS.

Respectfully submitted,

Date: August 8, 2003



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Enclosures

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PATENT
P36195 US (TH/KL)

IN THE SPECIFICATION:

Page 10, line 22, delete ~~578~~ and insert 1578.

IN THE CLAIMS:

1. (Currently Amended) A prepolymer composition for producing polyurethane insulating foams with fire-retardant properties from aerosol cans, wherein said prepolymer composition comprises:

a prepolymer component having at least one polyurethane (PU) prepolymer with a content of NCO groups of 4 to 20 wt%

said prepolymer being prepared from aromatic polyisocyanates and polyester-polyols prepared from aromatic polycarboxylic ~~acid~~ acids and ethylene glycol or glycerol, said polyester polyols having a hydroxyl number between about 100 and 300 and a functionality of 2 to 4 and

a propellant component selected from the group consisting of propane, butane, fluorocarbons and dimethyl ether, and combinations thereof,

wherein said prepolymer component is halogen-free and has a content of 5 to 40 wt%, of softening phosphates, phosphonates or combinations thereof having the formulae $O=P(OR)_3$ and $O=P(OR)_2R$, wherein R is the same or different and selected from aryl alkyl, aryl, or alkylaryl groups having up to 10 carbon atoms, based on the prepolymer content.

2. (Previously Presented) The prepolymer composition of claim 1, wherein the propellant is a fluorocarbon.

3. (Previously Presented) The prepolymer composition of claim 2, wherein said prepolymer is prepared from monomers selected from the group consisting of tolylene diisocyanate, and diphenylmethane diisocyanate.

Claims 4 and 5 (cancelled).

6. (Previously Presented) The prepolymer composition of claim 1 wherein the polyester polyols are at least partly phosphorous-modified, and the polyester-polyol is prepared from ethylene glycol.

Claims 7 and 8 (cancelled).

9. (Previously Presented) The prepolymer composition of claim 1, wherein propellant content is 5 to 40 wt% of the prepolymer composition.

10. (Previously Presented) The prepolymer composition of claim 1, wherein the propellant component is selected from the group consisting of propane and butane, and the

polyester-polyol is prepared from ethylene glycol.

11. (Previously Presented) The prepolymer composition of claim 1, wherein the propellant component contains fluorocarbon selected from the group consisting of C_2HF_5 , $C_2H_2F_4$ (unsymmetrical), $C_2H_3F_3$, $C_2H_4F_2$ (unsymmetrical) and mixtures thereof.

12. (Previously Presented) The prepolymer composition of claim 1, wherein the prepolymer composition additionally contains a flame-retardant additive which is free from chlorine and bromine.

13. (Previously Presented) The prepolymer composition of claim 12, wherein the flame-retardant additive is selected from the group consisting of melamine, melamine cyanurate, dimelamine phosphate, melamine phosphate, cyanodiamide, dicyanodiamide, aluminum trihydrate, ammonium polyphosphate and mixtures thereof.

14. (Previously Presented) The prepolymer composition of claim 1, wherein the initial service viscosity of the polyurethane prepolymer at 20°C is 5000 to 20000 mPa.s.

15. (Previously Presented) The prepolymer composition of claim, 1 wherein the initial service viscosity of the polyurethane prepolymer is between 8000 to 15000 mPa.s. at 20°C.

16. (Previously Presented) The prepolymer composition of claim 3 wherein softening phosphates and phosphonates are used for setting polyurethane insulating foams to be flame-retardant,

the propellant is a fluorocarbon, and

the polyester-polyol is prepared from ethylene glycol.

17. (Withdrawn) A pressure can for discharging 1C polyurethane insulating foams, filled with the prepolymer composition of Claim 1.

18. (Withdrawn) The prepolymer composition of Claim 3 wherein the polyester polyols have a molecular weight of 1000 to 2000.

19. (Withdrawn) The prepolymer composition of Claim 4 wherein the polyester polyols are ones based on ethylene glycol or glycerine and aromatic or aliphatic, preferably native, polycarboxylic acids.

20. (Withdrawn) The prepolymer composition of Claim 5 wherein the polyester polyols are at least partly phosphorus-modified.

21. (Withdrawn) The prepolymer composition of Claim 6, wherein a content of liquid polybutadiene is 0.01 to 2 wt%.
22. (Withdrawn) The prepolymer composition of Claim 8 wherein a propellant content of 5 to 40 wt%.
23. (Withdrawn) The prepolymer composition of Claim 9, wherein the propellant component contains propane, butane and/or dimethylether.
24. (Withdrawn) The prepolymer composition of Claim 10 wherein the propellant component contains fluorocarbon, in particular R 125, R 13a, R143 and/or R 152a.
25. (Withdrawn) The use of the prepolymer composition of Claim 11 wherein it additionally contains a flame-retardant additive which is free from chlorine and bromine.
26. (Withdrawn) The prepolymer composition of Claim 13, wherein initial services viscosity of the PU-prepolymer at 20°C is 5000 to 20000 mPa.s.
27. (Withdrawn) The use of the softening phosphates and phosphonates of Claim 11 for setting polyurethane insulating foams to be flame retardant.
28. (Withdrawn) A pressure can for discharging IC polyurethane insulating foams, characterized in that the composition comprises a prepolymer composition of Claim 15.